



09838862

A32562 (070050.1370)

PATENT

03CO
#3

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Ramadan et al.
Serial No. : To Be Assigned Examiner : To Be Assigned
Filed : April 20, 2001 Group Art Unit: To Be Assigned
For : COUPLER-MULTIPLEXER PERMUTATION SWITCH

I hereby certify that this paper is being deposited with
the United States Postal Service as First Class Mail in
an envelope addressed to:
Commissioner for Patents, Washington, D.C. 20231, on

July 20, 2001
Date of Deposit

Paul A. Ragusa
Attorney Name

38,587
Registration No.

[Signature]
Attorney Signature

July 20, 2001
Date of Signature

INFORMATION DISCLOSURE STATEMENT

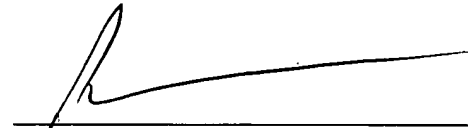
Commissioner for Patents
Washington, D.C. 20231

Sir:

Applicants respectfully request that the sixty-nine (69) documents, which
are listed in the attached PTO-1449 form, be "made of record" in the above-identified
patent application. Copies of these documents will be sent when they are available.

No fee is required. However, the Commissioner is hereby authorized to charge the payment of any additional fees to our Deposit Account No. 02-4377.

Respectfully submitted,

A handwritten signature in dark ink, appearing to be 'P. Ragusa', written over a horizontal line.

Paul A. Ragusa
Patent Office Reg. No. 38,587

Attorney for Applicants
212-408-2588

Enclosures

Form PTO-1449 U.S. Department of Commerce (REV. 2-82) Patent and Trademark Office INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	Atty. Docket No. 070050.1370 (A32562)	Serial No. To Be Assigned
	Applicant Ramadan et al.	
	Filing Date April 20, 2001	Group To Be Assigned
	(Empty space for additional information)	

U.S. PATENT DOCUMENTS

*Exam. Init.	Document No.	Date	Name	Class	Subclass	Filing Date if Appro.

FOREIGN PATENT DOCUMENTS

Document No.	Date	Country	Class	Subclass	Translation Yes No

OTHER DOCUMENTS (including Author, Title, Date, Pertinent Pages, Etc.)

	T.A. Ramadan et al., "A Novel 1 x 4 Coupler-Multiplexer Permutation Switch for WDM Applications", J. Lightwave Technol., Vol. 18, No. 4, pp. 579-88, 2000.
	Y. Tachikawa et al., "Arrayed-Wavelength Grating Multiplexers with loop-back optical paths and its applications", J. Lightwave Tech., Vol. 14, pp. 97-84, 1996.
	O. Ishida et al., "Digitally Tunable Optical Filters using Array-Waveguide grating (AWG) Multiplexers and Optical Switches", J. Lightwave Tech., Vol. 15, pp. 321-27, 1997.

Examiner	Date Considered
----------	-----------------

* Examiner: Initial citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

NY02:336937.1



Form PTO-1449 U.S. Department of Commerce
(REV. 2-82) Patent and Trademark Office

**INFORMATION DISCLOSURE STATEMENT
BY APPLICANT**

(Use several sheets if necessary)

Atty. Docket No.
070050.1370
(A32562)

Serial No.
To Be Assigned

Applicant
Ramadan et al.

Filing Date
April 20, 2001

Group
To Be Assigned

		A. A. M. Staring et al., "Phased-Array-Based Photonic Integrated Circuits for Wavelength Division Multiplexing Applications", ICICE Trans. Electron., Vol. E80-C, pp. 646-53, 1997.
		B. Mukherjee, "Optical Communication Networks", McGraw Hill, 1997.
		G.P. Agrawal, "Fiber Optic Communication Systems", John Wiley & Sons, 1997.
		L. Kazovsky et al., "Optical Fiber Communication Systems", Artech House, 1996.
		T. E. Stern and K. Bala, "Multiwavelength Lightwave Optical Networks: A Layered Approach", Addison-Wesely, 1999.
		R. Ramaswamy, "Multiwavelength Lightwave Networks for Computer Communication", IEEE Commn. Mag., Vol. 31, No. 2, pp. 78-88, 1993.
		F. Forghieri et al., "Reduction of four-wave-mixing crosstalk in WDM Systems using unequally spaced channels", IEEE Photon. Technol. Lett., Vol. 6, pp. 754-56, 1994.
		F. Forghieri et al., "WDM Systems with unequally spaced channels", J. Lightwave Technol., Vol. 13, pp. 889-97, 1995.
		D.A. Smith et al., "Integrated-optic acoustically tunable filters for WDM networks", IEEE J. Select. Areas Commun., Vol. 8, pp. 1151-59, 1990.
		H. Okayama et al., "Multiwavelength hiway photonic switches using wavelength-sorting elements-design", J. Lightwave Technol., Vol. 15, pp. 607-15, 1997.
		G. Chang et al., "Multiwavelength reconfigurable WDM/ATM/SONET network testbed", J. Lightwave Technol., Vol. 14, pp. 1320-40, 1996.

Examiner

Date Considered

* Examiner: Initial citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

NY02:336937.1



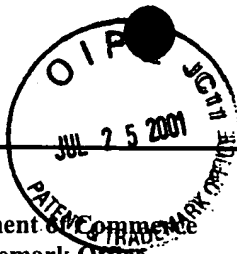
Form PTO-1449 U.S. Department of Commerce (REV. 2-82) Patent and Trademark Office INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	Atty. Docket No. 070050.1370 (A32562)	Serial No. To Be Assigned
	Applicant Ramadan et al.	
	Filing Date April 20, 2001	Group To Be Assigned

	J.L. Jackel et al., "Acousto-optic tunable filters (AOTF's) for multiwavelength optical cross-connects: crosstalk considerations", J. Lightwave Technol., Vol. 14, pp. 1056-66, 1996.
	D.A. Smith et al., "Evolution of the acousto-optic wavelength routing switch", J. Lightwave Technol., Vol. 14, pp. 1005 - 19, 1996.
	Y. Tachikawa et al., "Arrayed-waveguide grating multiplexers with loop-back optical paths and its applications", J. Light-wave Technol., Vol. 14, pp. 977 - 84, 1996.
	O. Ishida et al., "Digitally tunable optical filters using arrayed-waveguide grating (AWG) multiplexers and optical switches", J. Lightwave Technol., Vol. 15, pp. 321 - 27, 1997.
	B. Glance et al., "Applications of the integrated waveguide grating router", J. Light-wave Technol. , Vol. 12, pp. 957 - 62, 1994.
	A.A.M. Staring and M.K. Smit, "Phased-array-based photonic integrated circuits for wavelength division multiplexing applications", ICICE Trans. Electron., Vol. E80-C, pp. 646 - 53, 1997.
	D.A.B. Miller et al., "Band-edge electroabsorption in quantum well structures: The quantum-confined Stark effect", Phys. Rev. Lett., Vol. 53, pp. 2173 - 76, 1984.
	C.A. Brackett, "Forward-Is there an emerging consensus on WDM networking?", J. Light-wave Technol., Vol. 14, pp. 936 - 41, 1996.
	B.N. Thruston, E. Kapon, and Y. Silberberg, "Analysis of mode separation in multichannel branching waveguides", IEEE J. Quantum Electron. Vol. QE-23; pp. 1245 - 1255; 1987.
	G.J. Veldhuis, J.H. Brends, and P.V. Lambeck, "Design and characterization of a mode-splitting y- junction", J. Light-wave Technol., Vol. 14, pp.1746-1752, 1996.
	Y. Silberberg, P. Perlmutter, and J.E. Baran, "Digital optical switch". Appl. Phys. Lett., Vol. 51, pp. 1230 - 1232, 1987.

Examiner	Date Considered
----------	-----------------

* Examiner: Initial citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

NY02:336937.1



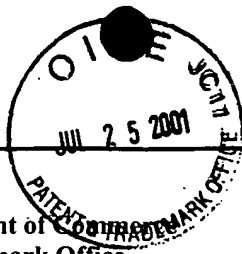
Form PTO-1449 U.S. Department of Commerce (REV. 2-82) Patent and Trademark Office INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	Atty. Docket No. 070050.1370 (A32562)	Serial No. To Be Assigned
	Applicant Ramadan et al.	
	Filing Date April 20, 2001	Group To Be Assigned
	(Empty space for additional information)	

		Hideaki Okayama and Masato Kawahara, "Reduction of voltage-length product for Y-branch digital optical switch", J. Light-wave Technol., Vol. 11, pp. 379 - 387, 1993.
		D. Marcuse, Theory of dielectric optical waveguides, 2nd Ed., Academic Press, 1991.
		D. Marcuse, "Bandwidth of forward and backward coupling directional couplers", J. Light-wave Technol., Vol. LT-5, pp. 1773 - 1777, 1987.
		D. Marcuse, "Directional Couplers made of nonidentical asymmetric slabs. Part II: Grating assisted couplers", J. Lightwave Technol., Vol. LT-5, pp. 268 - 273, 1987.
		H. Kogelnik, "Theory of optical waveguides", Ch.2 in: Guided-wave optoelectronics, Theodore Tamir (Ed.), Springer - Verlag, 1988.
		R. Scarmozzino and R.M. Osgood, Jr., "Comparison of finite-difference and fourier-transform solutions of parabolic wave equation with emphasis on integrated-optics applications", J Opt. Soc. Amer. A, Vol. 8, pp. 724 - 731, 1991.
		G.R. Hadley, "transparent boundary conditions for beam propagation method", IEEE J. Quantum Electron., Vol. 28, pp. 363 - 370, 1992.
		W.K. Burns and A.F. Milton, "Waveguide transitions and Junctions", Ch. 3 in: Guided-wave optoelectronics, Theodore Tamir (Ed.), Springer - Verlag, 1988.
		W.K. Burns and A.F. Milton, "Mode conversion in planar-dielectric separating waveguides", IEEE J. Quantum Electron., Vol. QE-11, pp. 32 - 39, 1975.
		A.F. Milton and W.K. Burns, "Tapered velocity couplers for integrated optics: Design", Appl. Opt., Vol. 14, pp. 1207 - 1212, 1975.
		W. Wakita, Semiconductor optical modulators, Kluwer Academic Publishers, 1998.

Examiner	Date Considered
----------	-----------------

* Examiner: Initial citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

NY02:336937.1



Form PTO-1449 U.S. Department of Commerce
(REV. 2-82) Patent and Trademark Office

**INFORMATION DISCLOSURE STATEMENT
BY APPLICANT**

(Use several sheets if necessary)

Atty. Docket No.
070050.1370
(A32562)

Serial No.
To Be Assigned

Applicant
Ramadan et al.

Filing Date
April 20, 2001

Group
To Be Assigned

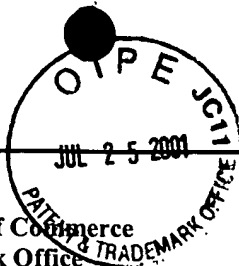
		T.H. Wood, "Multiple quantum well (MQW) waveguide modulators", J. Lightwave Technol., Vol. 6, pp. 743 - 757, 1988.
		K. Kawano, K. Wakita, O. Mitomi, I. Kataoka, and M. Naganuma, "Design of InGaAs-InAlAs multiple-quantum-well (MQW) optical modulators", IEEE J. Quantum Electron., Vol. 28, pp. 224 - 230, 1992.
		R.W. Martin, S.L. Wongt, R.J. Nicholas, K. Satzke, M. Gibbon, and E.J. Thrush, "The design of quantum-confined stark effect modulators for integration with 1.55 μm lasers", Semicond. Sci. Technol., Vol. 8, pp. 1173 - 1178, 1993.
		M. Cada, B.P. Keyworth, J.M. Glinski, A.J. SpringThrope, C. Rolland, and K.O. Hill, "Electro-optic switching in a p-i-n doped multiple quantum well directional coupler", J. Appl. Phys., Vol. 69, pp. 1760 - 1762, 1991.
		A. Stöhr, O. Humbach, S. Zumkley, G. Wingen, G. David, D. Jager, B. Ballig, E.C. Larkins, and J.D. Ralston, "InGaNs/GaAs multiple-quantumwell modulators and switches", Opt. Quantum Electron., Vol. 25, pp. S865 - S883, 1993.
		J.E. Zucker, I. Bar-Joseph, B.I. Miller, U. Koren, and D.S. Chemla, "Quaternary quantum wells for electro-optic intensity and phase modulation at 1.3 and 1.55 μm ", Appl. Phys. Lett., Vol. 54, pp. 10 - 12, 1989.
		H.K. Tsang, J.B.D. Soole, H.P. LeBlanc, R. Bhat, and M.A. Koza, "Efficient InGaAsP/InP multiple quantum well waveguide optical phase modulator", Appl. Phys. Lett., Vol. 57, pp. 2285 - 2287, 1990.
		J.S. Weiner, D.A.B. Miller, and D.S. Chemla, "Quadratic electro-optic effect due to quantum-confined Stark effect in quantum wells", Appl. Phys. Lett., Vol. 50, pp. 842 - 844, 1987.
		M. Born and E. Wolf, Principles of Optics, 5th Ed., Pergamon, 1975.
		I.M. Skinner, R. Shail, and B.L. Weiss, "Modal propagation within MQW wave guides", IEEE J. Quantum Electron., Vol. 25, pp. 6 - 11, 1989.
		R.A. Sammut and I.M. Skinner, "Effective index models for MQW waveguides", Opt. Commun., Vol. 76, pp. 213 - 216, 1990.

Examiner

Date Considered

* Examiner: Initial citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

NY02:336937.1



Form PTO-1449 U.S. Department of Commerce
(REV. 2-82) Patent and Trademark Office

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use several sheets if necessary)

Atty. Docket No.
070050.1370
(A32562)

Serial No.
To Be Assigned

Applicant
Ramadan et al.

Filing Date
April 20, 2001

Group
To Be Assigned

G.M. Alman, L.A. Molter, H. Shen, and M. Dutta, "Refractive index approximations from linear perturbation theory for planar MQW waveguides", IEEE J. Quantum Electron., Vol. 28, pp. 650 - 657, 1992.

B.M.A. Rahman, Y. Liu, and K.T.V. Grattan, "Finite-element modeling of one- and two-dimensional MQW semiconductor optical devices", IEEE Photon. Technol. Lett., Vol. 5, pp. 928 - 931, 1993.

S. Adachi, "Optical properties of $\text{In}_{1-x}\text{Ga}_x\text{As}_y\text{P}_{1-y}$ alloys", Phys. Rev. B, Vol. 39, pp. 12612 - 12621, 1989.

W. Streifer, D.R. Scifres, and R.D. Burnham, "Optical analysis of multiple-quantum-well lasers", Appl. Opt., Vol. 18, pp. 3547 - 3548, 1979.

N. Osman, M. Koshiba, and R. Kaji, "A comprehensive analysis of multilayer channel waveguides", J. Lightwave Technol., Vol. 12, pp. 821 - 826, 1994.

D.A.B. Miller, J.S. Weiner, and D.S. Cbernla, "Electric-field dependence of linear optical properties in quantum well structures: Waveguide electroabsorption and sum rules", J. Quantum Electron., Vol. QE-22, pp. 1816 - 1830, 1986.

K. Komatsu, K. Hamamoto, M. Sugimoto, A. Ajisawa, Y. Kohga, and A. Suzuki, "4x4 GaAs/AlGaAs optical matrix switches with uniform device characteristics using alternating $\Delta\beta$ electrooptic guided-wave directional couplers", J. Lightwave Technol., pp. 871 - 878, 1991.

K. Hamamoto, S. Sugou, K. Komatsu, and M. Kitamura, "Extremely low loss 4x4 GaAs/AlGaAs optical matrix switch", Electron. Lett., pp. 1580 - 1582, 1993.

P.J. Stevens, M. Whitehead, G. Parry, and K. Woodbridge, "Computer modeling of the electric field dependent absorption spectrum of multiple quantum well material", J. Quantum Electron., Vol. 24, pp. 2007 - 2016, 1988.

L.B. Soldano et al., "Optical Multi-Mode Interference Devices Based on Self-Imaging: Principle and Applications," J. Lightwave Technol., pp. 615-27, 1995.

D. Yevick et al., "Correspondence of Variational Finite-Difference (Relaxation) and Imaginary-Distance Propagation Methods for Modal Analysis," Opt. Lett., Vol. 17, pp. 329-30, 1992.

Examiner

Date Considered

* Examiner: Initial citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

NY02:336937.1



Form PTO-1449 U.S. Department of Commerce
(REV. 2-82) Patent and Trademark Office

**INFORMATION DISCLOSURE STATEMENT
BY APPLICANT**

(Use several sheets if necessary)

Atty. Docket No.
070050.1370
(A32562)

Serial No.
To Be Assigned

Applicant
Ramadan et al.

Filing Date
April 20, 2001

Group
To Be Assigned

M. Jaros, "Physics and Applications of Semiconductor Microstructures," Oxford University Press, 1989.

R.L. Liboff, "Introductory Quantum Mechanics," Addison Wesley, 1992.

J. Singh, "Semiconductor Optoelectronics: Physics and Technology," McGraw Hill, 1995.

M.N. Khan et al., "Fabrication-Tolerant, Low-Loss, and High-Speed Digital Optical Switches in InGaAsP/InP Quantum Wells," ECOC'95 (IEEE Cat. No. 95TH8127), Vol. 1, pp. 103-06, 1995.

T.A. Ramadan et al., "Adiabatic Couplers: Design Rules and Optimization," J. Lightwave Technol., Vol. 16, pp. 277-83, 1998.

A. Bandyopadhyay et al., "Low-Voltage Vertical Directional Coupler Switch with Suppressed Electroabsorption", IEEE J. of Quantum Elec., Vol. 32, No. 6, pp. 1048-53, 1996.

H.A. Haus et al., "Approximate analysis of optical waveguide grating coupling coefficients", Applied Optics, Vol. 15, No. 3, pp. 774-81, 1976.

R.C. Alferness et al., "Broadly tunable InGaAsP/InP buried rib waveguide vertical coupler filter", Appl. Phys. Lett. 60 (8), pp. 980-82, 1992.

Chi Wu, "A Vertically Coupled InGaAsP/InP Directional Coupler Filter of Ultranarrow Bandwidth", IEEE Phot. Technol. Lett., Vol. 3, No. 6, pp. 519-521, 1991.

Sakata et al., "Wavelength tuning in a grating-assisted vertical coupler filter using quantum well electrorefraction", Appl. Phys. Lett. 59 (24), pp. 3081-83, 1991.

S.L. Chuang, "Physics of Optoelectronic Devices," John Wiley & Sons, 1995.

Examiner

Date Considered

* Examiner: Initial citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

NY02:336937.1